

## **Chemometric analysis of bone dose response: A Preliminary Study of FTIR Spectroscopy**

Pedro Arthur Augusto de Castro, Derly Augusto Dias, Denise Maria Zezell  
*Center for Lasers and Applications – IPEN-CNEN/SP*

The use of ionizing radiation for treatment and diagnosis of many diseases has been well documented. The health effects of ionizing radiation improved patient care, however, incorrect handling of radiation technology may pose potential health risks. In light of this, Fourier-transform infrared spectroscopy combined with attenuated total reflectance (ATR-FTIR) offers a nondestructive, label-free technique for identifying functional groups in biological samples. In this work, fragments of bone were collected from bovine femur diaphysis. Samples were cut and polished until 1 cm x 1 cm x 1 mm, which were then stored properly in the refrigerated environment. Samples irradiation was performed with a multipurpose irradiator of Cobalt-60 at doses of 15 kGy and 25 kGy. Spectral data was submitted for the second derivative. Thereafter, the amplitude of the second derivative was organized for hierarchical clustering in conjunction with a heatmap. In order to carry out the chemometric analyses, all procedures were performed using MATLAB (The Mathworks Inc., Natick, MA, USA). Based on these results, an examination of the cluster heatmap reveals that the unique behavior for each group which may be correspond to the ionizing radiation change in the spectra. Hence, these findings suggest new possibilities for spectral monitoring of dose responses.